

# Introduction

## Background:

Mumbai and Delhi are the two most important metro cities in India. There has always been a comparison in terms of quality of life, jobs, education, entertainment and recreational facilities that these cities have to offer to its residents. This project elaborates on a data science project that attempts to analyse the neighbourhoods in each of these two cities and tries to understand what is popular in them and what they have to offer to someone who is contemplating to make a choice about living in either of the metro cities.

The deciding factor for most would be on how lively, supportive, vibrant and unique each of the cities can be when compared to each other. The business problem in this study assumes that people who would be interested in this study are those who would like to create a projection of potential life and activities in these metro city neighbourhoods if the subject moves to live in one of them. The decision to choose one over the other would depend on popular venues in the neighbourhoods in each of these metro cities.

## Problem Statement:

Analyse the data regarding venues in Delhi and Mumbai. Cluster these neighbourhoods and draw conclusions as to what the

## Data Acquisition & Cleaning

### Data Source

For this study, we will need data about neighbourhoods in each of these metro cities. The data published by the government on postal codes for all India would serve us well for this study. We will specifically download the CSV provided under <https://data.gov.in/resources/all-india-pincode-directory-contact-details-along-latitude-and-longitude>.

In this study, we will download the CSV, read it into a pandas Data frame and curate it to remove the data related to all other cities, towns, and places which are not Mumbai or Delhi, since we are only interested in comparing these two biggest metro cities in India.

We shall then clean up the unnecessary columns in the CSV, which is not relevant or useful for our current study. Post office names (office name) will be used as the neighbourhood names in each of the regions such as Mumbai or Delhi.

Neighbourhood names with the same Pin code will be combined as a single row.

Foursquare API will be used to find the longitude and latitude of each of the neighbourhoods in both Mumbai and Delhi. This will form the dataset we will use for this study.

Combining these sources of data we will cluster the neighbourhoods to group them and understand them in depth.

### Data Cleaning

Data downloaded from various sources were combined into a dataframe. The dataframe was checked for missing or NaN values. Unnecessary columns were removed from the data frame.

## Methodology

### Acquiring postal codes data

- First step in the project is to get a list of all neighbourhoods or areas in the country. This data we obtained from the data posted by the Indian govt. on a official website. The file was downloaded and read into a data frame.
- The data was filtered to take only the data pertaining to Delhi & Mumbai. Also, the columns that were not necessary for our analysis was removed to get the data frame as shown below.

	Neighborhood	pincode	regionname
0	Anand Vihar S.O	110092	Delhi
1	Azad Nagar S.O (East Delhi)	110051	Delhi
2	Babarpur S.O (North East Delhi)	110032	Delhi
3	Badarpur Khadar B.O	110090	Delhi
4	Balbir Nagar S.O	110032	Delhi

- Neighbourhoods were grouped into a single row separated by comma delimiter.

	pincode	regionname	Neighborhood
0	110001	Delhi	Baroda House S.O, Bengali Market S.O, Bhagat S...
1	110002	Delhi	A.G.C.R. S.O, Ajmeri Gate Extn. S.O, Darya Gan...
2	110003	Delhi	Delhi High Court Extension Counter S.O, Delhi ...
3	110004	Delhi	Rashtrapati Bhawan S.O
4	110005	Delhi	Anand Parbat Indl. Area S.O, Anand Parbat S.O,...

### Acquiring Latitude & Longitude Details

- Pgeocode library was installed. It was used to collect latitude & longitude details for the postal codes in the country 'IN' using the function 'query\_postal\_code' by giving the postal codes from our earlier as input. The columns not necessary for the analysis was removed to give the following data frame.

	pincode	latitude	longitude
0	110001	28.6369	77.218229
1	110002	28.6453	77.245600
2	110003	28.5947	77.225270
3	110004	28.6453	77.212800
4	110005	28.6551	77.188775

- The 2 data frames were merged on Pin code column to give the following data frame

	pincode	regionname	Neighborhood	latitude	longitude
0	110001	Delhi	Baroda House S.O, Bengali Market S.O, Bhagat S...	28.6369	77.218229
1	110002	Delhi	A.G.C.R. S.O, Ajmeri Gate Extn. S.O, Darya Gan...	28.6453	77.245600
2	110003	Delhi	Delhi High Court Extension Counter S.O, Delhi ...	28.5947	77.225270
3	110004	Delhi	Rashtrapati Bhawan S.O	28.6453	77.212800
4	110005	Delhi	Anand Parbat Indl. Area S.O, Anand Parbat S.O,...	28.6551	77.188775

- The data was divided into 2 data frames, one for Delhi and one for Mumbai.

## Acquiring Venue details

- Using the Foursquare API, we collect the details of venues in each of the neighbourhoods by creating a function `getNearbyVenue()` to get the following data frame.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Bazargate S.O, Elephanta Caves Po B.O, M.P.T. ...	18.9474	72.8138	H2O And Salt Water Grill	18.950535	72.816868	Harbor / Marina
1	Bazargate S.O, Elephanta Caves Po B.O, M.P.T. ...	18.9474	72.8138	Queens Necklace	18.945443	72.817872	Harbor / Marina
2	Kalbadevi H.O, Ramwadi S.O, S. C. Court S.O, T...	18.9750	72.8258	Celejor	18.975844	72.823679	Bakery
3	Kalbadevi H.O, Ramwadi S.O, S. C. Court S.O, T...	18.9750	72.8258	cafe coffee day	18.976988	72.824051	Coffee Shop
4	Kalbadevi H.O, Ramwadi S.O, S. C. Court S.O, T...	18.9750	72.8258	HDFC Bank	18.973795	72.822895	Bank

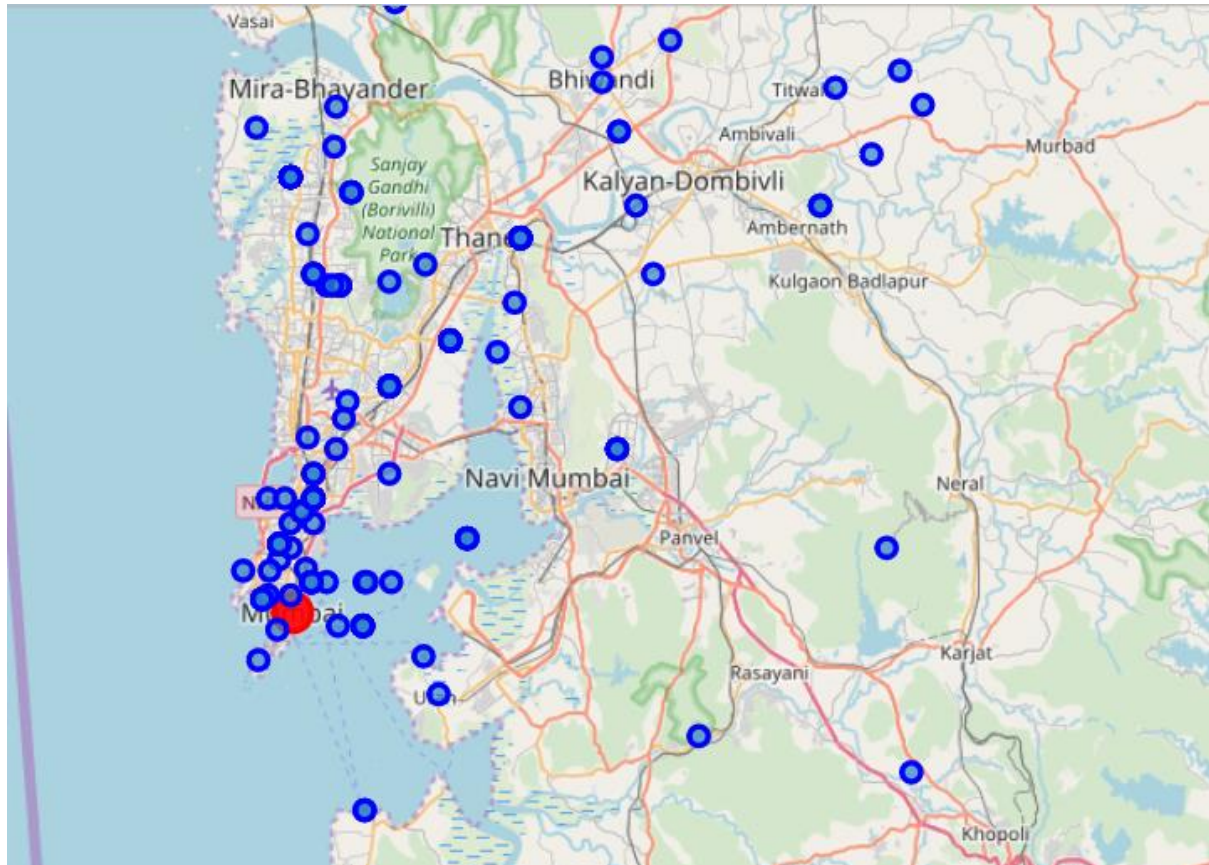
- A new data frame was created by grouping the data based on each neighbourhood for both Mumbai and Delhi data.

	Neighborhood	ATM	Airport Lounge	American Restaurant	Aquarium	Asian Restaurant	Astrologer	Athletics & Sports
0	A I Staff Colony S.O, Santacruz P&t Colony S.O	0.0	0.0	0.0	0.0	0.142857	0.0	0.0
1	Aareymilk Colony S.O, Nagari Niwara S.O, S R P...	0.0	0.0	0.0	0.0	0.000000	0.0	0.0
2	Agashi S.O, Chikhal Dongre B.O, Kophrad B.O, V...	0.0	0.0	0.0	0.0	0.000000	0.0	0.0
3	Agripada S.O, BPC Jacob Circle S.O, Chinchpok...	0.0	0.0	0.0	0.0	0.000000	0.0	0.0
4	Airoli B.O, Airoli S.O	0.0	0.0	0.0	0.0	0.125000	0.0	0.0

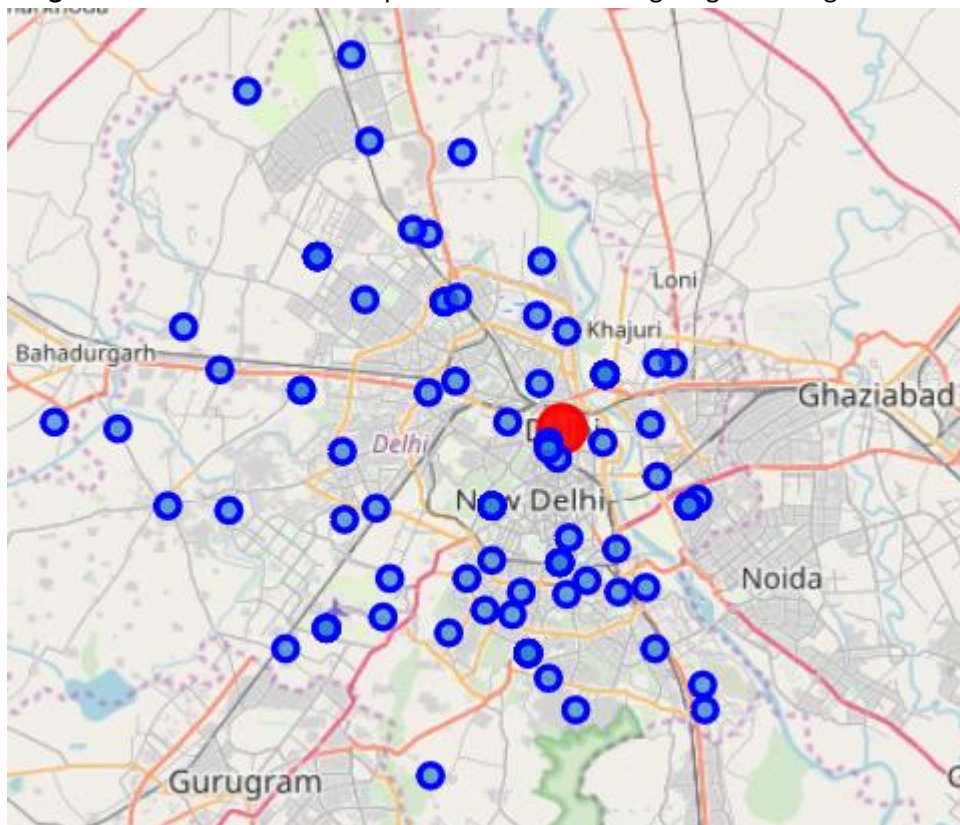
- A function was created to get the 10 most common venues for Mumbai and Delhi neighbourhoods separately.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	A I Staff Colony S.O, Santacruz P&t Colony S.O	Café	Coffee Shop	Modern European Restaurant	Asian Restaurant	Indian Restaurant	Tea Room	Spa	Yoga Studio	Farmers Market	Farm
1	Aareymilk Colony S.O, Nagari Niwara S.O, S R P...	Smoke Shop	Bookstore	Indian Restaurant	Bakery	Fast Food Restaurant	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant
2	Agashi S.O, Chikhal Dongre B.O, Kophrad B.O, V...	Dhaba	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Diner	Dumpling Restaurant	Electronics Store	Farm
3	Agripada S.O, BPC Jacob Circle S.O, Chinchpok...	History Museum	Multiplex	Fast Food Restaurant	Snack Place	Fish & Chips Shop	Cosmetics Shop	Deli / Bodega	Department Store	Dessert Shop	Dhaba
4	Airoli B.O, Airoli S.O	Pizza Place	Toy / Game Store	Café	Dumpling Restaurant	Asian Restaurant	Fast Food Restaurant	Gym	Hotel Bar	Dessert Shop	Fish & Chips Shop

**Neighbourhoods in Mumbai** were plotted in the following diagram using Folium library.



**Neighbourhoods in Delhi** were plotted in the following diagram using Folium library.





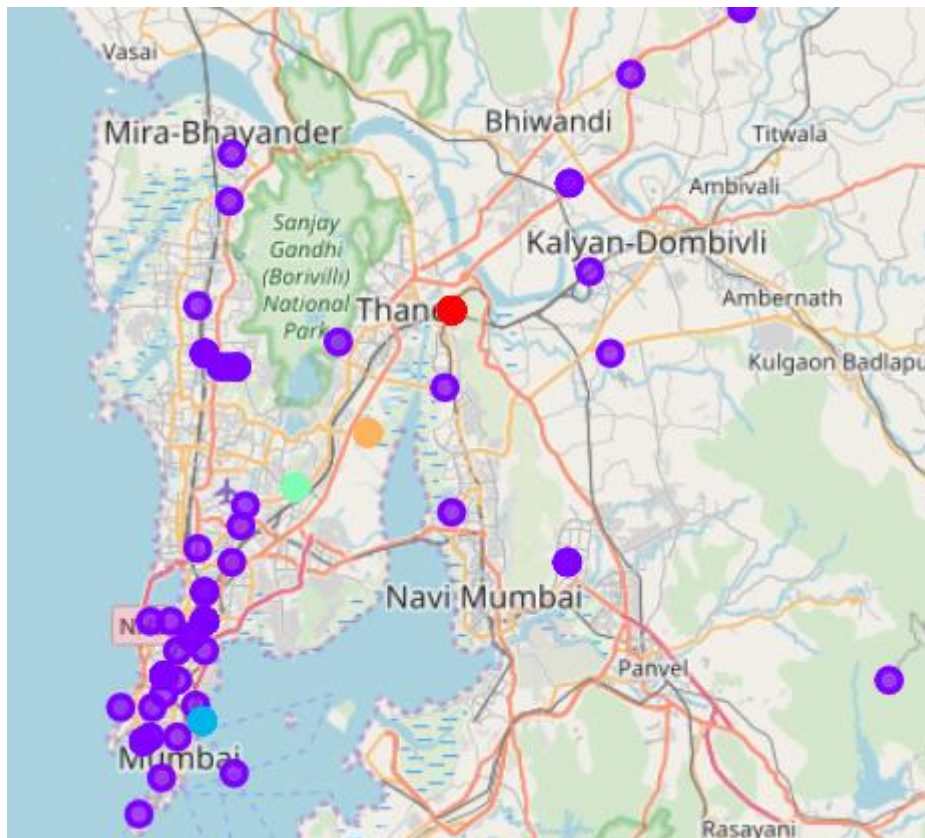
## Clustering Neighbourhoods

Using K Means algorithm, the neighbourhoods were clustered into 5 clusters. We will further discuss the details in the next sections.

## Result

### Mumbai Neighbourhood Clusters

We clustered the Mumbai neighbourhoods using K means algorithm. Below is the map presentation of different clusters represented by different colours.



## Cluster 0:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
89	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
90	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
91	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
92	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
93	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
94	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
95	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
96	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
97	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
98	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
99	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
100	Mumbai	0	Fish & Chips Shop	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store

12 neighbourhoods belong to this cluster. The neighbourhoods belonging to this cluster are popular for having Fish and Chips shop, Yoga Studio, Delis, and Convenience stores. This neighbourhood seems like a place where a young population would enjoy as it comes with various restaurants of different cuisines as well Yoga Studios and necessities like convenience store.

## Cluster 1:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Mumbai	1	Harbor / Marina	Yoga Studio	Flea Market	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
1	Mumbai	1	Coffee Shop	Athletics & Sports	Bakery	Bank	Food	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant
2	Mumbai	1	Indian Restaurant	Cheese Shop	Middle Eastern Restaurant	Restaurant	Rest Area	Market	Food	Electronics Store	Fast Food Restaurant	Ice Cream Shop
3	Mumbai	1	Harbor / Marina	Indian Restaurant	Train Station	Café	Food Truck	Juice Bar	Japanese Restaurant	Pizza Place	Fast Food Restaurant	Restaurant
4	Mumbai	1	Gym	Garden	Bar	Yoga Studio	Flea Market	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner
...	...	...	...	...	...	...	...	...	...	...	...	...
213	Mumbai	1	ATM	Plaza	Flea Market	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
216	Mumbai	1	Café	Pizza Place	Fast Food Restaurant	Yoga Studio	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner
217	Mumbai	1	Hotel	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
218	Mumbai	1	Hotel	Convenience Store	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
224	Mumbai	1	Hotel	Indian Restaurant	Food Truck	Seafood Restaurant	Fish & Chips Shop	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner

76 neighbourhoods are grouped into this cluster. This Cluster contains harbour, gym, ATM, cafes, flea markets as well as variety of stores and restaurants.

## Cluster 2:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
5	Mumbai	2	Boat or Ferry	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
37	Mumbai	2	Boat or Ferry	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
49	Mumbai	2	Boat or Ferry	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
63	Mumbai	2	Boat or Ferry	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
77	Mumbai	2	Boat or Ferry	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm

5 neighbourhoods are grouped into this cluster. The most common venue in this cluster is boat or ferry. So, it would be a good place for people who depend on boats or ferries for transport.

## Cluster 3:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
58	Mumbai	3	Men's Store	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
59	Mumbai	3	Men's Store	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
60	Mumbai	3	Men's Store	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
61	Mumbai	3	Men's Store	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
62	Mumbai	3	Men's Store	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm
64	Mumbai	3	Men's Store	Food	Deli / Bodega	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store	Farm

6 neighbourhoods are grouped into this cluster. The most common venue in this cluster is Men's store followed by different restaurants.

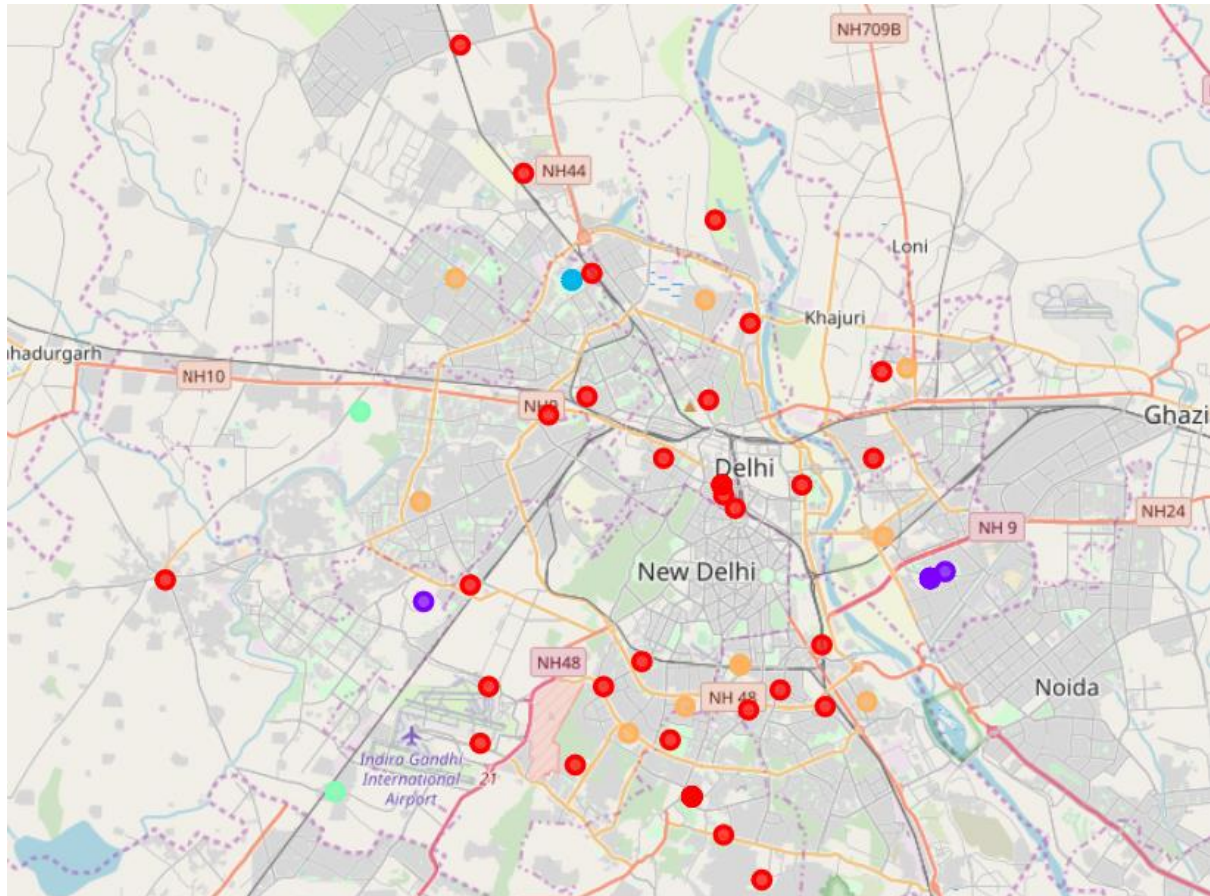
## Cluster 4:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
68	Mumbai	4	Clothing Store	Movie Theater	Yoga Studio	Flea Market	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
69	Mumbai	4	Clothing Store	Movie Theater	Yoga Studio	Flea Market	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
70	Mumbai	4	Clothing Store	Movie Theater	Yoga Studio	Flea Market	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
71	Mumbai	4	Clothing Store	Movie Theater	Yoga Studio	Flea Market	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
72	Mumbai	4	Clothing Store	Movie Theater	Yoga Studio	Flea Market	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
73	Mumbai	4	Clothing Store	Movie Theater	Yoga Studio	Flea Market	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store
75	Mumbai	4	Clothing Store	Movie Theater	Yoga Studio	Flea Market	Department Store	Dessert Shop	Dhaba	Diner	Dumpling Restaurant	Electronics Store

7 neighbourhoods are grouped into this cluster. This Cluster contains Movie theatres as the 2nd most common venues. Could be a good place for theatre buffs to hang around.

## Delhi Neighbourhood Clusters

We clustered the Delhi neighbourhoods using K means algorithm. Below is the map presentation of different clusters represented by different colours.



## Cluster 0:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Delhi	0	Indian Restaurant	Chinese Restaurant	Café	Lounge	Hotel	Deli / Bodega	Bar	Platform	Dessert Shop	Falafel Restaurant
1	Delhi	0	Food & Drink Shop	Women's Store	Garden	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant	Flea Market
3	Delhi	0	Hotel	Restaurant	Café	Indian Restaurant	Hostel	Pizza Place	Indian Chinese Restaurant	Bakery	Motel	Road
4	Delhi	0	Pharmacy	Hotel	Smoke Shop	Asian Restaurant	Snack Place	Ice Cream Shop	Dessert Shop	Donut Shop	Department Store	Fabric Shop
5	Delhi	0	Hotel	Restaurant	Café	Indian Restaurant	Hostel	Pizza Place	Indian Chinese Restaurant	Bakery	Motel	Road
6	Delhi	0	Pizza Place	Fast Food Restaurant	Bank	Flea Market	Sandwich Place	Grocery Store	Snack Place	Chinese Restaurant	Donut Shop	Indian Restaurant
7	Delhi	0	Hotel	Restaurant	Café	Indian Restaurant	Hostel	Pizza Place	Indian Chinese Restaurant	Bakery	Motel	Road
12	Delhi	0	Platform	Café	Moving Target	Food Court	Women's Store	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant

36 neighbourhoods belong to this cluster. This cluster has pubs, coffee shops, restaurants, in addition to malls and History Museums.



## Cluster 1:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
44	Delhi	1	Snack Place	Women's Store	Deli / Bodega	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant	Flea Market
87	Delhi	1	IT Services	Gym	Snack Place	Women's Store	Fried Chicken Joint	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant
88	Delhi	1	Gym	Women's Store	Garden	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant	Flea Market
90	Delhi	1	IT Services	Gym	Snack Place	Women's Store	Fried Chicken Joint	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant
91	Delhi	1	IT Services	Gym	Snack Place	Women's Store	Fried Chicken Joint	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant
92	Delhi	1	IT Services	Gym	Snack Place	Women's Store	Fried Chicken Joint	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant
93	Delhi	1	IT Services	Gym	Snack Place	Women's Store	Fried Chicken Joint	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant
94	Delhi	1	IT Services	Gym	Snack Place	Women's Store	Fried Chicken Joint	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant

8 neighbourhoods belong to this cluster. This cluster mainly contains IT services, Gym and snack places. It might be an area to stay for employees working in IT services.

## Cluster 2:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
32	Delhi	2	Shoe Store	Mobile Phone Shop	Women's Store	Deli / Bodega	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant
33	Delhi	2	Shoe Store	Mobile Phone Shop	Women's Store	Deli / Bodega	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant
37	Delhi	2	Shoe Store	Mobile Phone Shop	Women's Store	Deli / Bodega	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant

3 neighbourhoods belong to this cluster. This cluster is a good shopping hub as it contains shoe stores, women's and mobile phone stores, fabric shop along with dessert and donut shops.

## Cluster 3:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
46	Delhi	3	ATM	Garden	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant	Flea Market	Food
48	Delhi	3	ATM	Garden	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant	Flea Market	Food
59	Delhi	3	ATM	Gym / Fitness Center	Garden	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant	Flea Market

3 neighbourhoods belong to this cluster. This cluster mainly contains ATM, gyms and gardens. Might be a good place for joggers.

## Cluster 4:

	regionname	ClusterLabels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
8	Delhi	4	Indian Restaurant	Mobile Phone Shop	Garden	Ice Cream Shop	Fried Chicken Joint	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant
17	Delhi	4	Women's Store	Indian Restaurant	Airport	Department Store	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant	Flea Market
21	Delhi	4	Indian Restaurant	Athletics & Sports	Modern European Restaurant	Bistro	Bakery	Deli / Bodega	Art Gallery	Gift Shop	Fabric Shop	Falafel Restaurant
22	Delhi	4	Indian Restaurant	Athletics & Sports	Modern European Restaurant	Bistro	Bakery	Deli / Bodega	Art Gallery	Gift Shop	Fabric Shop	Falafel Restaurant
24	Delhi	4	Indian Restaurant	Airport Service	Hotel	Garden	Dessert Shop	Donut Shop	Electronics Store	Fabric Shop	Falafel Restaurant	Fast Food Restaurant
26	Delhi	4	Indian Restaurant	Athletics & Sports	Modern European Restaurant	Bistro	Bakery	Deli / Bodega	Art Gallery	Gift Shop	Fabric Shop	Falafel Restaurant

12 neighbourhoods belong to this cluster. The neighbourhoods belonging to this cluster is popular for having Indian restaurants. It also contains Athletics & sports venues and modern European restaurants.

## Discussion & Conclusion

In this project, we have taken the data for two of India's metro cities and have tried to analyse the neighbourhood regions in these metro cities based on the top venues they have. We have clustered the neighbourhoods based on the most common top venues in each of the neighbourhood. We tried to understand the difference in the type of venues in these metros, which can offer decision points for anybody who is considering settling in either of the metro cities.

Given our cluster information for both Mumbai and Delhi, we see that Mumbai and its neighbourhoods are a great place for a foodie. There are a lot of restaurants, cafes, bars, etc in Mumbai neighbourhoods. Also due to the proximity of Mumbai to the seashore, Mumbai neighbourhoods offer for harbours, seafood, boat, and ferry rides.

On the other hand, Delhi neighbourhoods are good for those who like Arts and Crafts, History Museums and Pizza places. There is very less in terms of foreign cuisine restaurants in Delhi. Mumbai, on the other hand, is great for international visitors, expats, etc, because of the variety and types of food outlets it has. Delhi is inland and its neighbourhoods have proximity to Water Parks, Museums and Arts, and Crafts stores.